

Docket No.: 42P15138

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE  
BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of:

Anders Grunnet-Jepsen et al.

Application No. 10/749,774

Filed: December 30, 2003

For: HITLESS VARIABLE-REFLECTIVE  
TUNABLE OPTICAL FILTER

Examiner: Charlie Peng

Art Unit: 2883

**CERTIFICATE OF TRANSMISSION**

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on 12-30-2008 /Lawrence M. Mennemeier/

Date

Lawrence M. Mennemeier

**APPELLANT'S BRIEF UNDER 37 CFR § 41.37**  
**IN SUPPORT OF APPELLANT'S APPEAL TO THE BOARD OF PATENT**  
**APPEALS AND INTERFERENCES**

Mail Stop Appeal Brief-Patents  
Commissioner of Patents  
PO Box 1450  
Alexandria, VA 22313-1450

Dear Sir:

Appellant hereby submits this Brief in support of an appeal from a non-final decision of the Examiner, in the above-referenced case. Appellant respectfully requests consideration of this appeal by the Board of Patent Appeals and Interference for allowance of the above-referenced patent application.

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I. Real Party in Interest

The real party in interest in the present appeal is Intel Corporation of Santa Clara, California, the assignee of the present application.

II. Related Appeals and Interferences

There are no related appeals or interferences to appellant's knowledge that would have a bearing on any decision of the Board of Patent Appeals and Interferences.

III. Status of the Claims (independent claims shown in bold)

Claims 19-40 are pending in the application.

Claims 26-38 are withdrawn by the Examiner from consideration.

Claims **19** and **39**-40 stand rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over U.S. Patent 6,836,621 (Bendelli).

Claims 20-21 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Bendelli in view of U.S. Patent 4,442,750 (Bowley).

Claims 22-25 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Bendelli in view of U.S. Patent 4,898,468 (Udd).

Non-final rejection of claims **19**-25 and **39**-40 is being appealed.

#### IV. Status of Amendments

An amendment and response to a Restriction Requirement mailed 7/13/2005 was submitted by appellant on 11/14/2005 and was entered. A first Office Action was mailed 12/14/2005. Appellant responded with an amendment and official response on 6/14/2006, which was entered. A second Office Action was mailed on 9/16/2006. Appellant responded with an amendment and official response on 1/8/2007, which was not entered. A corrected amendment and response to a Notice of Non-compliant Amendment mailed 3/27/2007 was submitted by appellant on 6/25/2007 and was entered. A third Office Action was mailed on 9/17/2007. Appellant responded with an amendment and official response on 3/16/2008, which was entered. A fourth Office Action was mailed on 6/27/2008. A Notice of Appeal was transmitted on 12/29/2008, and an appeal ensued. Another amendment is being submitted, under 37 CFR § 41.33 and concurrent with the present appeal brief.

Accordingly, the claims stand as of the concurrently submitted amendment of 12/30/2008, and are reproduced in clean form in the Claims Appendix.

## V. Summary of Claimed Subject Matter

Appellant's disclosure describes a variable-reflective tunable optical filter that includes an interferometer adapted to control the powers of added or dropped signals and an optical waveguide grating to select the wavelength channels of the added or dropped signals. The waveguide grating is tunable to filter a dropped signal from an input data stream and filter an added signal into an output data stream. While a reflection band of the waveguide grating is being adjusted to tune a wavelength channel, the phase of at least one leg of the interferometer may be adjusted to direct signals of any wavelength channel selected by said waveguide from the input data stream to the output data stream, thereby providing hitless optical add-drop multiplexing.

According to one embodiment as set forth in claim 19, the apparatus comprises a Sagnac interferometer with a waveguide grating to select a wavelength of an added or dropped signal, wherein said waveguide grating is distributed **{par. 43, Fig. 4b, 421}**; and a phase adjustment circuit **{par. 42, Fig. 4b, 425}** coupled with said Sagnac interferometer to control the power of said added or dropped signal. **{pars. 26, 31 & 40; Fig. 3b, 322, 325}**

According to embodiments as set forth in claims 20 and 21 respectively, the phase adjustment circuit comprises a heater, or the phase adjustment circuit is piezoelectric. **{pars. 16 & 41}**

According to another embodiment as set forth in claim 22, the apparatus of claim 19 further comprises a frequency adjustment circuit coupled with said waveguide grating to tune the frequency of said added or dropped signal. **{par. 42, Fig. 4b, 423}**

According to another embodiment as set forth in claim 39, a wave-division multiplexing (WDM) system comprises a plurality of Sagnac interferometers, each of said plurality of Sagnac interferometers respectively comprising a waveguide grating to reflect a

wavelength of a respective added or dropped channel and a phase adjustment circuit coupled with the respective Sagnac interferometer to control the power of said added or dropped signal. **{pars. 47-52; Figs. 5a, 5b and 6}**

VI. Grounds of Rejection to be Reviewed on Appeal

A. Claims **19** and **39-40** stand rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over U.S. Patent 6,836,621 to Bendelli.

B. Claims 20-21 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Bendelli in view of U.S. Patent 4,442,750 to Bowley.

C. Claims 22-25 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Bendelli in view of U.S. Patent 4,898,468 to Udd.

VII. Argument

A. 35 U.S.C. § 103(a) REJECTIONS BASED ON U.S. PATENT 6,836,621

Claims **19** and **39-40** stand rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over U.S. Patent 6,836,621 (hereafter “Bendelli”).

1. Claim **19** Is Not Obvious.

With regard to Claim 19, the Office Action mailed June 27, 2008 claims, without further explanation, that Bragg grating 2 of Figure 1 is distributed.

Appellant respectfully submits Bendelli does not disclose or suggest that Bragg grating 2 of Figure 1 is distributed.

In contrast, the Office Action mailed September 6, 2006, found no disclosure of a distributed Bragg grating in the Sagnac interferometer 5, but instead stated that Bendelli teaches the Bragg gratings define a Fabry-Perot cavity 8 and that tuning can be carried out by means of voltage command.

Appellant has also respectfully submitted that the Fabry-Perot cavity 8 described with regard to Figure 3 is not deployed in a Sagnac interferometer as set forth by Claim 19. Nor is Bendelli's phase control element 7 of Figure 3 coupled with a Sagnac interferometer to control the power of the added or dropped signal.

Further, the Examiner has admitted that Bendelli does not disclose or suggest the use of phase control element 7 to control the power of added or dropped signals as set forth in Claim 19. Instead as a teaching that constructive and destructive interference can be adjusted to control the power of the signal, the Examiner points to paragraph [0026] of Appellant's own specification, which says, "by adjusting the phase of at least one of the two halves of a reflected wavelength channel the power and/or direction of an added or dropped signal may be controlled by adjusting the amount of constructive and destructive interference."

Bendelli, on the other hand, says that the phase control element 7 can be a static phase shift device of appropriate value (col. 4, lines 61-62).

Appellant respectfully submits that without viewing the prior art in retrospect with the aid of appellant's disclosure, no disclosure or suggestion is provided by Bendelli for the subject matter set forth by Claim 19.

Accordingly, in the Office Action mailed June 27, 2008, the Examiner has failed to make a prima facie case of obviousness.



## 2. Claims 39-40 Are Not Obvious.

With regard to Claim 39-40, the Office Action mailed June 27, 2008 states that Bendelli teaches a Sagnac interferometer with a phase controller but that Bendelli does not disclose a plurality of such Sagnac interferometers. The Examiner further alleges that Appellant has not disclosed how a plurality of Sagnac interferometers interact in a WDM system, or are optically connected to each other.

Appellant respectfully disagrees and points out that, the present specification discloses an example embodiment of variable-reflective tunable optical filters comprising a plurality of Sagnac interferometers optically connected to each other in a WDM system 601 (Fig. 6; pars. 49-52).

Additionally, as stated above, the Examiner has admitted that Bendelli does not disclose or suggest the use of phase control element 7 to control the power of added or dropped signals as set forth in Claim 39.

Accordingly, in the Office Action mailed June 27, 2008, the Examiner has failed to make a prima facie case of obviousness.

B. 35 U.S.C. § 103(a) REJECTIONS BASED ON BENDELLI & U.S. PAT. 4,442,750

Claims 20-21 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Bendelli in view of U.S. Patent 4,442,750 to Bowley.

1. Claims 20-21 Are Not Obvious.

With regard to Claim 20-21, the Office Action mailed June 27, 2008 states that Bendelli teaches a Sagnac interferometer with a phase controller but that Bendelli does not disclose how phase adjustment is accomplished. The Examiner claims that Bowley's phase-modulation techniques would obviously be included into Bendelli by one of skill in the art.

Appellant respectfully submits that it is not clear that Bowley's phase-modulation techniques could or would be used to control the power of add or dropped signals as claimed. For example the phase-modulation techniques of Bowley involve plucking a fiber optic cable to cause vibrations, sometimes in a particular field (Figs. 5-8; col. 10 line 29 through col. 11, line 11).

Appellant respectfully submits that even if the Sagnac interferometer of Bendelli could be mechanically made to vibrate, it is not obvious how to control the power of add or dropped signals through such techniques.

Accordingly, in the Office Action mailed June 27, 2008, the Examiner has failed to make a prima facie case of obviousness.

C. 35 U.S.C. § 103(a) REJECTIONS BASED ON BENDELLI & U.S. PAT. 4,898,468

Claims 22-25 are rejected under 35 U.S.C. 103(a) as allegedly being unpatentable over Bendelli in view of U.S. Patent 4,898,468 to Udd.

Claims 22-25 Are Not Obvious.

With regard to Claim 22-25, the Office Action mailed June 27, 2008 states that Bendelli teaches a Sagnac interferometer with a phase controller but that Bendelli does not disclose a frequency adjustment circuit.

Appellant believes that the dependant claims are also allowable at least due to their dependence from a patentable independent claim. The Examiner claims that Udd's frequency shifter would obviously be included into Bendelli by one of skill in the art because by comparing the output of the system with the frequency shifter switched "off" and "on" the location and magnitude of a disturbance may be deduced.

Appellant respectfully submits that even if the Sagnac interferometer of Bendelli were provided with the frequency shifter of Udd to determine the location and magnitude of a disturbance, it is not obvious how comparing the output of the system with the frequency shifter of Udd switched "off" and "on" can be used to tune the frequency of add or dropped signals as claimed.

Accordingly, in the Office Action mailed June 27, 2008, the Examiner has failed to make a prima facie case of obviousness.

Conclusion

Appellant submits that all claims now pending are in condition for allowance. Such action is earnestly solicited at the earliest possible date. If there is a deficiency in fees, please charge our Deposit Acct. No. 50-0221.

Respectfully submitted,

Date: December 30, 2008

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VIII. Claims Appendix: Claims Involved in Appeal (Clean Copy)

1-18 (Canceled)

19. (Previously Presented) An apparatus comprising:

a Sagnac interferometer comprising a waveguide grating to select a wavelength of an added or dropped signal, wherein said waveguide grating is distributed; and

a phase adjustment circuit coupled with said Sagnac interferometer to control the power of said added or dropped signal.

20. (Previously Presented) The apparatus of Claim 19 wherein said phase adjustment circuit comprises a heater.

21. (Previously Presented) The apparatus of Claim 19 wherein said phase adjustment circuit is piezoelectric.

22. (Previously Presented) The apparatus of Claim 19 further comprising:

a frequency adjustment circuit coupled with said waveguide grating to tune the frequency of said added or dropped signal.

23. (Original) The apparatus of Claim 22 wherein said frequency adjustment circuit comprises a heater.
24. (Original) The apparatus of Claim 22 wherein said frequency adjustment circuit is piezoelectric.
25. (Previously Presented) The apparatus of Claim 19 further comprising:
- a frequency adjustment circuit coupled with said waveguide grating to tune a reflection band of said waveguide grating to select the wavelength of said added or dropped signal; and
  - a phase adjustment circuit coupled with said Sagnac interferometer to provide hitless optical add-drop multiplexing when the reflection band of said waveguide grating is being tuned.
26. (Withdrawn) A system comprising:
- a first port to receive an input wave-division multiplexing (WDM) data stream including a plurality of wavelength channels;
  - a second port to output an express WDM data stream including said plurality of wavelength channels;
  - a third port to receive an added signal of a first wavelength channel of said plurality of wavelength channels;
  - a fourth port to output a dropped signal of the first wavelength channel; and
  - a Sagnac interferometer to control the power of said added or dropped signal, said

Sagnac interferometer comprising an optical waveguide grating to select the first wavelength channel of said added or dropped signal and to filter said dropped signal from the input WDM data stream and said added signal to the express WDM data stream.

27. (Withdrawn) The system of Claim 26 wherein a phase of said Sagnac interferometer is adjusted to direct a signal of any wavelength channel selected by said optical waveguide grating from the input WDM data stream to the express WDM data stream while a reflection band of the optical waveguide grating is being adjusted to select the first wavelength channel.

28. (Withdrawn) The system of Claim 26 wherein said optical waveguide grating is a tunable Bragg grating.

29. (Withdrawn) An apparatus comprising:

- a Sagnac interferometer including a beam-splitting coupler;
- a Michelson interferometer including said beam-splitting coupler and a waveguide grating to reflect a first wavelength; and
- a phase shifter coupled with said Michelson interferometer to adjust the interference of the first wavelength at said beam-splitting coupler between a destructive interference and a constructive interference.

30. (Withdrawn) The apparatus of Claim 29 wherein said waveguide grating is tunable.

31. (Withdrawn) The apparatus of Claim 30 wherein said waveguide grating is a Bragg grating.
32. (Withdrawn) The apparatus of Claim 30 wherein said waveguide grating is segmented.
33. (Withdrawn) The apparatus of Claim 29 wherein said Sagnac interferometer is a planar lightwave circuit interferometer.
34. (Withdrawn) The apparatus of Claim 33 wherein said Michelson interferometer is the same planar lightwave circuit interferometer.
35. (Withdrawn) The apparatus of Claim 34 wherein said planar lightwave circuit interferometer comprises a quartz glass waveguide. .
36. (Withdrawn) The apparatus of Claim 34 wherein said planar lightwave circuit interferometer comprises a silicon resin waveguide
37. (Withdrawn) The apparatus of Claim 29 wherein said phase shifter is a thermo-optic phase shifter.



38. (Withdrawn) The apparatus of Claim 29 wherein said phase shifter is a stress-optic phase shifter.

39. (Previously Presented) A wave-division multiplexing (WDM) system comprising:  
a plurality of Sagnac interferometers, each of said plurality of Sagnac interferometers respectively comprising a waveguide grating to reflect a wavelength of a respective added or dropped channel and a phase adjustment circuit coupled with the respective Sagnac interferometer to control the power of said added or dropped signal.

40. (Original) The system of Claim 39 wherein a respective phase of each of said plurality of Sagnac interferometers is adjustable to direct signals of any wavelength reflected by said waveguide from an input WDM data stream to an express WDM data stream while a reflection band of the waveguide grating is being adjusted to reflect the wavelength of the respective added or dropped channel.

41-48 (Canceled)

IX. Evidence Appendix: Copies of Evidence Relied Upon by Appellant

**Exhibit A**

i. U.S. Patent 6,836,621 (Bendelli)

The above cited reference was entered in the record by the examiner with the Office Action mailed on December 14, 2005.

i. U.S. Patent 4,442,750 (Bowley)

The above cited reference was entered in the record by the examiner with the Office Action mailed on December 14, 2005.

i. U.S. Patent 4,898,468 (Udd)

The above cited reference was entered in the record by the examiner with the Office Action mailed on December 14, 2005.

X. Related Proceedings Appendix: Copies of Decisions Rendered by a Court or the Board in any Prior and Pending Appeals, Interferences or Judicial Proceedings

There are no related appeals or interferences to appellant's knowledge that would have a bearing on any decision of the Board of Patent Appeals and Interferences.